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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/767,292	01/29/2004	Hai Cong	CS03-016	4993

7590 08/08/2005

STEPHEN B. ACKERMAN
28 DAVIS AVENUE
POUGHKEEPSIE, NY 12603

EXAMINER	
GURLEY, LYNNE ANN	
ART UNIT	**PAPER NUMBER**
2812	

DATE MAILED: 08/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/767,292	CONG ET AL.
	Examiner	Art Unit
	Lynne A. Gurley	2812

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 July 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

LYNNE A. GURLEY
PRIMARY PATENT EXAMINER
TC 2800, AU 2812

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

This Office Action is in response to the response/remarks to final office action, filed 7/22/05.

Currently, claims 1-30 are pending.

Response to Arguments

1. Applicant's arguments, see pages 3-9, filed 7/22/05, with respect to the rejection(s)of claim(s) 1-30 under 35 USC 103(a) have been fully considered and are persuasive. Therefore, the **finality of the rejection** in the previous Office Action **has been withdrawn**. However, upon further consideration, a new ground(s) of rejection is made under 35 USC 103(a) in view of Weidman et al. (US 2003/01760580 in view of Wang et al. (US 2005/0110152).

Specification

1. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weidman et al. (US 2003/0176058, dated 9/18/03, field 3/18/02) in view of Wang et al. (US 2005/0110152, dated 5/26/05, effectively filed 11/13/02).

Weidman shows the method as claimed in figures 1A-1H and corresponding text, with substrate 2 including insulating layer 6 with embedded conductor 4, IMD 16, hard masks 20 and 22, via opening 32 with photoresist 42 and BARC 40. The hard mask and IMD layers are patterned and etched to form open via and trench openings (figs. 1E-1H) for subsequent conducting metal fill. [0009] shows that the hard mask layers are formed of SiC or SiN.

Weidman lacks anticipation only in not explicitly teaching that the BARC is formed with photoresist and that the via is filled with photoresist; the thicknesses of layers, and some materials of the IMD/hard mask stack, the etching formula, repeating the steps to form multiple layers of interconnect, cu seed layer in the trench and via openings, forming excess copper metal over the copper seed layer and then planarizing the excess copper, and, MOSFET CMOS memory and logic devices.

Wang teaches, in a similar process, a dual damascene structure is formed using a coating of BARC 216 covering two hard mask layers 214/212. Wang teaches specifically that the BARC is also used to fill the opening and that a second photoresist covers the BARC (fig. 224). Wang acknowledges that the BARC is a type of photoresist that does not have photosensitivity ([[0025] – [0028]. The BARC is treated as a type of photoresist and even is removed with the overlaying photoresist because of its resist/polymer material.

It would have been obvious to one of ordinary skill in the art to have had formed the BARC layer of photoresist and to have filled the via openings with photoresist, in the method of Weidman, with the motivation that treated or specific types of photoresist are conventionally used as BARC layers and photoresist has also been commonly used to fill a via to facilitate patterning of an opening, especially of the damascene type in an insulating stack. The used of

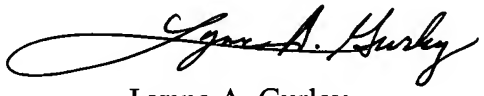
photoresist as a BARC film and to fill the via would make the process more efficient in that less materials would have to be used. Additionally, it would have been obvious to one of ordinary skill in the art to have formed the BARC of resist and to have filled the via openings with resist, in the method of Weidman, with the motivation that Wang teaches that BARC is a type of photoresist which has been treated to not have the photosensitivity and, Wang even refers to the overlying photoresist as a second photoresist.

It would have been obvious to one of ordinary skill in the art to have had the claimed ranges of thicknesses of layers, and the claimed materials of the IMD/hard mask stack, the etching formula, to have repeated the steps to form multiple layers of interconnect, to have had a cu seed layer in the trench and via openings, to have formed excess copper metal over the copper seed layer and then planarized the excess copper, and, to have had MOSFET CMOS memory and logic devices, in the method of Weidman, with the motivation that these parameters are within the scope of conventional processing parameters and well know to those of ordinary skill in the art. The cu seed layers and planarization of excess cu are also well known processing steps for cu interconnect technology. Additionally, the inclusion of MOSFET CMOS memory and logic devices in the substrate beneath the interconnect is conventional as well and obvious to one of ordinary skill in the art. Also, see Wang for typical/conventional thicknesses of layers.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynne A. Gurley whose telephone number is 571-272-1670. The examiner can normally be reached on M-F 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Lebentritt can be reached on 571-272-1873. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Lynne A. Gurley
Primary Patent Examiner
TC 2800, Art Unit 2812

LAG
August 5, 2005